

Reagan's clean-up veto nixed

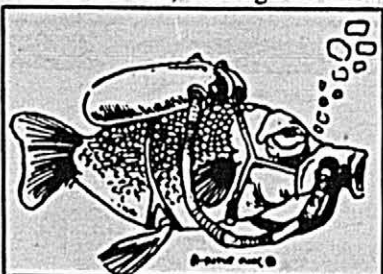
by Paul A. White

If you are concerned with environmental pollution, you will be glad to hear that the US government plans to spend \$20 billion over the next seven years to clean up its polluted waterways.

Early last month, the legislation known as the Clean Water Bill became law, no thanks to US President Ronald Reagan.

In October 1986, the bill was vetoed by Reagan. The veto, called a pocket veto, occurred when Reagan refused to sign the bill within the required ten days after the adjournment of the 99th congress. This pocket veto could not be overridden because Congress was no longer in session. However, angry lawmakers made this Water Quality Act the first item of business in the new Congress of 1987.

Fortunately, Reagan had not seen the last of the clean water legislation, and a bill identical to the one vetoed in October had found its way to his desk by late January. Once again the President vetoed the bill, although he knew



that Congress would override his veto and enact the measure into law the following week.

Reagan said that he rejected the bill to stress to Congress that he would fight attempts to increase domestic spending when budget deficits were soaring. "I know this veto is going to be overridden", he told a group of supporters at a White House meeting. "I know that I do not have the votes to sustain it. But it's time we did the right thing, all of us, regardless of the political fallout."

Lobbyists for environmental groups assailed the President's action, and Daniel Wiess of the Sierra Club called it, "an insult to the environment."

For such a viewpoint the President was labelled out of step with national priorities, and the willingness of the public to support a cleaner environment. Senator Quentin N. Burdick, a North Dakota Democrat who heads the Environment and Public Works Committee went so far as to call the veto "an exercise in futility". He added, "The Senate wants this bill. The House wants this bill. The American people want this bill. The President stands alone on this one."

Legislators said that Reagan was out of touch with national

priorities and that Americans desired a cleaner environment.

The large votes predicted to override the veto came in early February. In the Senate the veto was overridden by a vote of 86 to 14, and in the House of Representatives by a vote of 401 to 26. Both votes represented a greater than two-thirds majority needed in both congressional houses to override a President's veto.

The clearance of the law marked the culmination of a bipartisan drive to cut pollution. The bill's major provisions include the construction of sewage treatment plants over the next seven years at a cost of \$18 billion, additional pollution control programs costing \$2 billion, and new efforts to clean such estuaries as Long Island Sound and New York Harbour.

The Clean Water Act will allocate funds to all states through 1994. New York will receive the most with \$267.9 million annually through 1990.

The bill's provisions will also include conferences to be directed by the Environmental Protection Agency on estuaries that are particularly important to fish and wildlife.

Although the passing of the bill is being viewed as an important step forward in the national goal of making the US waterways fit for fishing and swimming, some environmentalists are skeptical.

Rick Hind of the US Public Interest Research Group noted that by government estimates, more than \$100 billion would be needed to end pollution of US waterways. Hind said the bill "is just a down payment".

The Clean Water Act is not the first legislation of its kind to have been passed by the US Government. In 1965 President Lyndon B. Johnson signed the Water Quality Act proclaiming: "water pollution is doomed in this century.... we are going to reopen the Potomac River for swimming in 1975".

Two decades later, Johnson's promise no longer appears quite so grandiose. As far as water pollution today in the US is concerned, many rivers and lakes are staging remarkable comebacks. On the other hand many are still mired in filth.

Across the US, the quality of some 47,000 miles of monitored streams is markedly improved. In Lake Erie, pronounced biologically dead 15 years ago; Perch, Walleye, and even Largemouth Bass and Coho salmon are thriving. Trout have even returned to the Hudson River near New York City.

But elsewhere, 311,000 miles of waterways have worsened or remained unchanged. Industrial

poisons such as arsenic, chromium, lead and PCB's have turned Boston Harbour into a murky soup from which people haul Flounder with large liver tumours and other cancerous sores.

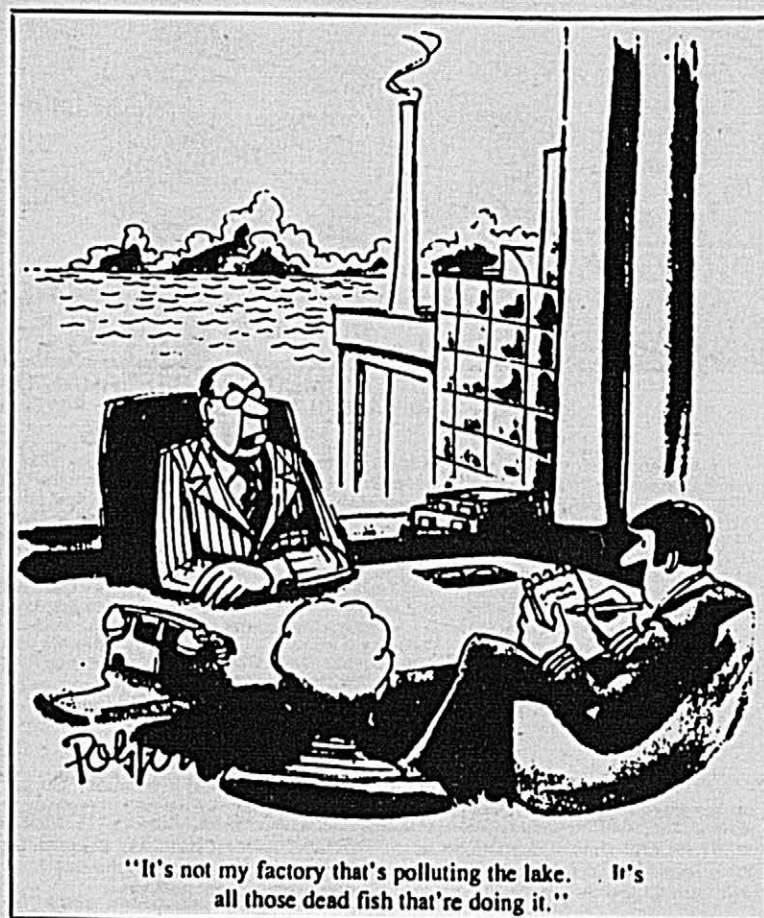
The Mississippi River is reaching its "limits of abusability", warns Oliver Houck, a Tulane University environment professor.

Although more than \$4 billion has been spent since the late 1960's to upgrade treatment work along New Jersey's Passaic River, the river is still "probably one of the worst" bodies of water in the US, says New Jersey water quality expert Shing-Fu Hsueh.

Time is running out. The \$20 billion allocated by the Clean Water Act will be gone by the end of 1994. Unless Congress enacts new legislations, cities and states will be left on their own to finish the clean up. But as Robert Savage, head of a group of state water officials warns, "it is not a job that we start and end." It is a job that requires a continuing commitment at the federal, state and municipal levels.

Surveys show that Canadians also rank environmental protection high on their list of government priorities. A report from Decima research, one of Canada's largest polling organizations, found that protecting the environment is more important to most Canadians than saving jobs. Decima president Allan Gregg stated that 69 per cent of Canadians were willing in June 1986 to support moves to protect the environment even if those measures affected employment.

Most provinces in cooperation with Environment Canada and the Environmental Protection Service have taken measures over the past ten years to reduce water pollution.



In Québec the provincial government has begun programs such as La Programme d'Assainissement des Eau Usée as an attempt to clean up Québec's waste water.

An Environment Canada representative in Montréal stated that although Québec lags behind most provinces in its treatment of waste water, \$20 million is now being spent to improve water quality in the province. In addition, Environment Minister Tom MacMillan has pledged to clean up 55 industries now dumping their waste water into the St. Lawrence River.

Although Canada has not experienced the extreme levels of water degradation found in many parts of the industrialized world,

an overall assessment of the state of Canada's waterways does not suggest grounds for complacency. The State of the Environment Report for Canada in 1986 stated that although a good many toxic contaminant levels appear to be declining (e.g., dioxin and PCB's in the Great Lakes and mercury in most Canadian streams), levels in many areas still exceed various health guidelines.

It is clear that there must be far more legislation in both Canada and the US specifically aimed at cleaning up this continent's waterways. Action must be taken now to ensure that this planet's most precious resource, essential to all life forms, is still available for future generations.

Non-students occupy to stop FAE

by Brendan Weston

Three people are barricaded inside the office of McGill's VP of Research, Gordon MacLachlan, in protest of renewed research into Fuel Air Explosions (FAEs) at McGill.

The group, which entered the third floor Dawson Hall office early yesterday morning, has vowed to stay until the Board of Governors withdraws its approval of the Department of National Defence contract.

But according to MacLachlan, "It is very unlikely that a Board decision would be reversed."

before its regular meeting March 16.

McGill Engineering Professors Knystautas and Lee began researching FAEs — the most powerful non-nuclear weapons known — since 1981. Their renewed contract was approved by the Board in October.

FAEs have been described by the Stockholm Peace and Research Institute as "inhumane and indiscriminate weapons." But researchers say their study may be useful in preventing industrial accidents caused by gas explosions.

But Amy Kaler, a member of a McGill ad-hoc committee opposing the contract, said "continued on page 6"



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For more information contact PGSS VP Administration André Couture or PGSS Speaker Stephen Fraser at 392-5959 or 392-5899.

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Me and Helios down by the lab

by Dan Hogan

Today, at dozens of research laboratories around the world, physicists are creating momentary "artificial suns" - superheated star-like fuels burning at temperatures in the tens of millions of degrees Celsius. Their purpose: to harness this violent release of energy for the production of electricity.

The basic process, called nuclear fusion, has been demonstrated since the early 50's when the first hydrogen bombs were tested. Unlike nuclear fission, in which a heavy, unstable nucleus splits, nuclear fusion involves the bringing together of two light nuclei. In both types of reaction, there is a slight decrease in mass between initial and final products. This difference is made up for by a corresponding release of energy, the amount of which is huge in comparison.

reactor against the possibility of a major meltdown.

But how realistic is the commercial production of fusion energy and what are the implications of fusion research? These questions and others were addressed last Wednesday, February 25, at a lecture entitled, *Is Nuclear Fusion a Feasible, Safe and Peaceful Source of Energy?* sponsored by the McGill Student Physics Society and McGill Student Pugwash.

Dr. James Castracane, a plasma physicist at MPB Technologies Inc. in Dorval, opened the talk. He began by outlining some of the problems in satisfying our expanding energy demands. Fossil fuels are running out and some, such as coal, pose serious environmental problems. Most hydroelectric sites have already been exploited. Large-scale solar energy is unlikely in the near term. And with accidents and questions of

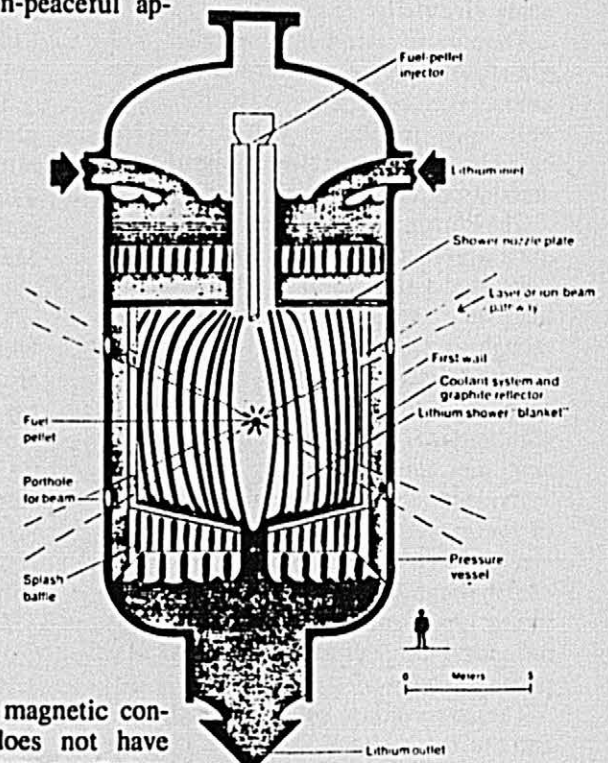
through the action of high-frequency radio waves.

The inertial confinement design uses quite a different approach (see fig. 2). High-power laser or particle beams are focused on tiny pellets of deuterium and tritium. The effect is similar to confining the implosion of tiny hydrogen bombs and converting the energy to a useful form.

But while physicists are on the verge of demonstrating fusion's scientific feasibility, challenging engineering problems have yet to be solved. The containment structures for fusion devices are prone to neutron-induced damage. With time, the innermost wall of the vacuum container can become brittle and radioactive. Furthermore, an effective tritium-breeding blanket of lithium has yet to be developed. One problem with lithium is that it reacts violently with air and water, thus complicating the tritium recycling process. Assuming technological solutions to these problems can be

proved H-bomb designs. Furthermore, researchers working on peaceful applications of inertial confinement fusion are often hampered by military interests in sharing their scientific knowledge because of its non-peaceful applications.

Figure 2:
Inertial
confinement
fusion reactor
(interior view).



By comparison, magnetic confinement fusion does not have such obvious military overtones. Although the neutrons produced in a fusion reactor could be used to manufacture tritium and plutonium for military purposes, there are presently much cheaper ways of doing this. Furthermore, as Castracane pointed out, "the by-products produced in a fusion reactor under normal operation would not be suitable in the production of nuclear weapons."

The question of future military applications of nuclear research in general, however, is still open. According to Lovejoy, one of the most ominous possibilities of future research is the development of an "anti-matter bomb". Recently, the Reagan administration expressed interest in funding a giant \$6 billion superconducting particle accelerator. Some have hypothesized that such a machine could one day produce anti-hydrogen (in which the electron and proton are replaced by the positron and anti-proton). If as little as one microgram of this substance were allowed to come into contact with normal hydrogen, complete annihilation would ensue with a destructive force equivalent to that of a fission bomb containing 3 to 5 kilograms of plutonium.

How then do we distinguish between peaceful and military uses of scientific research? Dr. Gordon Edwards, a Math & Science professor at Vanier College, believes that this question is becoming increasingly difficult to answer. "We are seeing a dangerous blurring of civilian and military," he said, a blurring to which scientists themselves are contributing.

He cited Star Wars research as an example of collaboration between scientists and the military. Although almost no scientist believes Reagan's "defensive" shield will work as advertised, many scientists participate in Star Wars research, primarily for the funding. And even though their

own research interests may be non-military, Dr. Edwards said, "scientists are still plugged into this infernal machine."

But blaming scientists for the proliferation of weapons of mass

destruction, all agreed, is inappropriate. It is the military-industrial complex, not the scientific community, which controls the arms race. What is most disturbing about the role that scientists play in the arms race is that, as Lovejoy pointed out, their research is also coming under Pentagon control both in the US and in Canada (and, one could argue, under Kremlin control in the Soviet Union). "More than half of all military research," said Lovejoy, "funded by the Pentagon outside the US is in Canada."

Furthermore, an "insidious element" is present, Dr. Edwards said, in the masking of military applications as peaceful ventures. In 1974, for example, India announced that it set off a "peaceful" nuclear explosion. It was later alleged that the plutonium used in this device was produced in a US-built reprocessing plant from the uranium waste of a CANDU reactor. Incidents such as these, Edwards argued, prove that the development of nuclear technology is primarily for military purposes.

It has been suggested that one possible solution to this dilemma would be to ensure that future funding of research on peaceful nuclear technology, including fusion power, come from non-military sources. That way, scientists would not be under so much military control and could openly share their scientific knowledge with the rest of the world.

It seems that the very survival of our democratic system is at stake here. If we are to allow a military elite to make crucial decisions on our collective technological fate, then we will effectively be giving up our right to self-determination. What we are left with is the choice of how we will determine who will make these decisions.

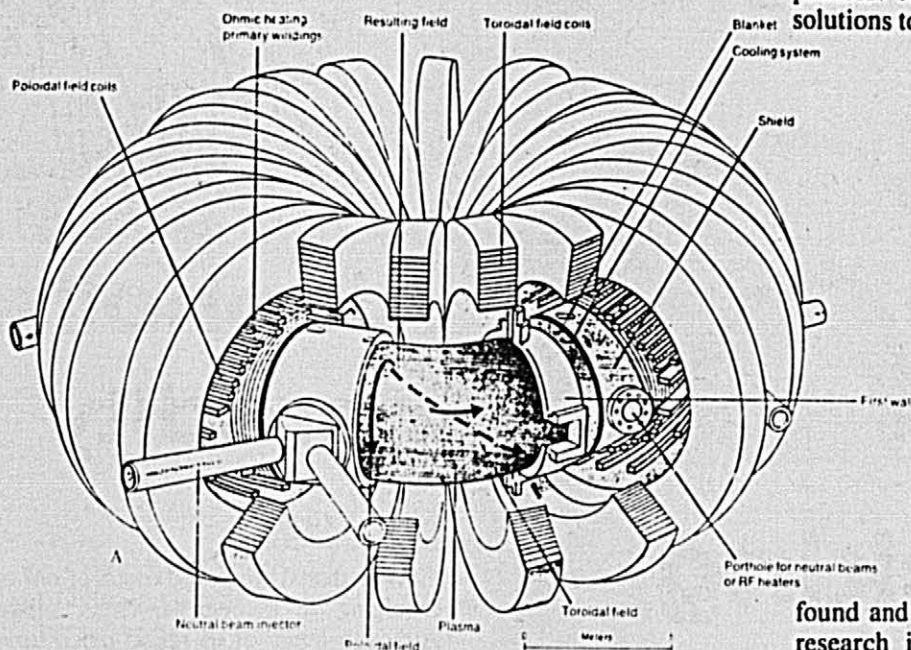


Figure 1: Magnetic confinement fusion reactor (Tokamak design).

Perhaps one of the most promising fusion reactions that is being studied for use in future fusion power plants is the conversion of deuterium and tritium, two isotopes of hydrogen, into an energetic alpha particle and neutron. The energy of the outgoing particles can then be converted into thermal energy which can drive electricity-producing turbines.

This process has several attractive features. First, it can take place more easily than other fusion reactions. Second, the fuels for this reaction are virtually unlimited. Deuterium occurs naturally in seawater and can be readily extracted, while tritium can be artificially bred by the bombardment of the fusion neutrons on a blanket of lithium. Third, the radioactive waste produced by this process is short-lived, unlike the long-lived radioisotopes produced in fission reactors, and is therefore environmentally easier to manage. Finally, because of the small amount of fuel needed, it is virtually impossible for a large, uncontrolled release of energy to take place, safeguarding a fusion

nuclear proliferation, fission energy has gained a tarnished reputation.

Fusion energy, on the other hand, has shown some impressive progress lately. Some of the latest fusion devices will soon break an important threshold - the amount of power produced just equals the amount of external power required to fire them up. For net electrical power generation, this output will have to increase roughly fifteen-fold. Fortunately, studies indicate that scaled-up designs will eventually be able to achieve this goal.

The two most promising design concepts are magnetic confinement and inertial confinement fusion. Magnetic confinement requires strong magnetic fields to suspend a floating mass of superheated plasma, a state of matter in which the electrons and nuclei are too energetic to stay together. One Soviet design, called the Tokamak, confines this plasma in a doughnut or torus shape (see fig. 1). Because the plasma is thermally isolated from the walls of the reactor, it can reach high temperatures through the injection of neutral particle beams or

found and that funding for fusion research is maintained, a commercial fusion reactor might become a reality at the beginning of the twenty first century, hopefully just before our fossil fuel reserves are exhausted.

So what are some of the short term implications of fusion research? Dr. Shaun Lovejoy of McGill's Physics Department addressed this question. "Inertial confinement fusion research," he said, "has become increasingly funded by the military...results are often classified since they involve high-powered lasers and particle beams with Star Wars applications."

He cited one example in which research on fusion has fallen under government censorship. In 1986, a research group working on fusion at the University of Berkeley in California tried to publish their work on the free-electron laser. Although this work was unclassified, the Strategic Defense Initiative (SDI) Office intervened and prevented its publication.

Another military use of research on inertial confinement fusion is in the improvement of thermonuclear weapons (hydrogen or H-bombs). The interaction between the laser or particle beam and the fuel pellet onto which it is focused is, at the same time, crucial to research on im-

Electric fish

by Jennifer Sachs

Long before Benjamin Franklin zapped himself flying a kite, another type of creature was already producing and using electricity.

Though all nervous, muscular and glandular tissue generate minute amounts of electricity, only fish, and only seven families of fish at that, are capable of generating significant amounts of electricity.

The human heart for example, can induce a voltage between .001 and .002 volts at the surface of the body. Even the very weakest of electric fish though, are capable of generating one hundred times this amount in their surrounding water. This ability to produce high voltages sets these fish apart from any other animal.

Evidence shows an age old awareness of the consequences of tangling with electric fish. Drawings of the electric catfish have been found on Egyptian tombs, and Romans were even said to have used the electric Torpedo rays as a primitive form of shock therapy.

The association between electricity and the fish's shock was made only in the mid-1700s. Before this time it was believed that the fish emitted a type of poisonous venom.

Carlo Matteucci and Emil DuBois-Reymond, in 1842, first researched the mystery of the fish. They found minute amounts of electricity contained in the muscle and nerve tissues.

Soon after this the basic functioning of the fish was suggested. A century later, in the early 1950s it was finally proven to be true.

In every fish capable of producing electricity there exists an electric organ. This organ, in almost all cases, is made up of modified muscle cells. These modified cells operate on the same principles as ordinary nerve and muscle cells, however in order to become specialized in their task they have developed into a specific formation.

Each thin, plate-like cell, or electroplaque, makes contact on just one side with a dense network of nerve terminals. The other side consists of a great number of deep folds that serve to increase the area of the membrane.

The electroplaques are "stacked" one on top of the other to form columns, the length and number of which depend on the type of fish. The stacking of the plates is such that all the similar sides face in the same direction.

In order to produce electricity, voltage differences must be generated across the membrane of the cell. To do this the cell maintains a high density of potassium ions and is surrounded by sodium ions. This makes the inside of the cell negative and the outside positive.

When a cell is at its resting potential, no ions pass in either direction through the membranes, and therefore no current flows. When the membrane is stimulated by a nerve impulse the permeability changes and ions flow through the cell. All of the current flows in one direction since the cells all face the same direction.

In the case of the electric eel the cell orientation is such that the current runs from the tail to the head.

For the purpose of increased efficien-

cy one side of the membrane has an increased area to permit more ions to flow through. In order to channel current through the organ there exists insulating connective tissue that runs along the edges of the electroplaques. This keeps the voltage difference uniform across the plates.

The configuration and number of the plates determines the voltages and currents that the fish are capable of producing. Just as with batteries, many plates in series produce a high voltage. Many plates in parallel produce a high current.

The two most powerful electric fish which best exemplify these two cases are the Electric eel and the Torpedo ray. The eel has anywhere from 6 to 10 thousand plates in each of its columns (ie. in series) and about 140 of these columns running the length of its body. With this arrangement it is capable of generating 600 volts but at a current of only one ampere.

The ray on the other hand has approximately 1,000 plates in series, and 2,000 columns in parallel. This allows

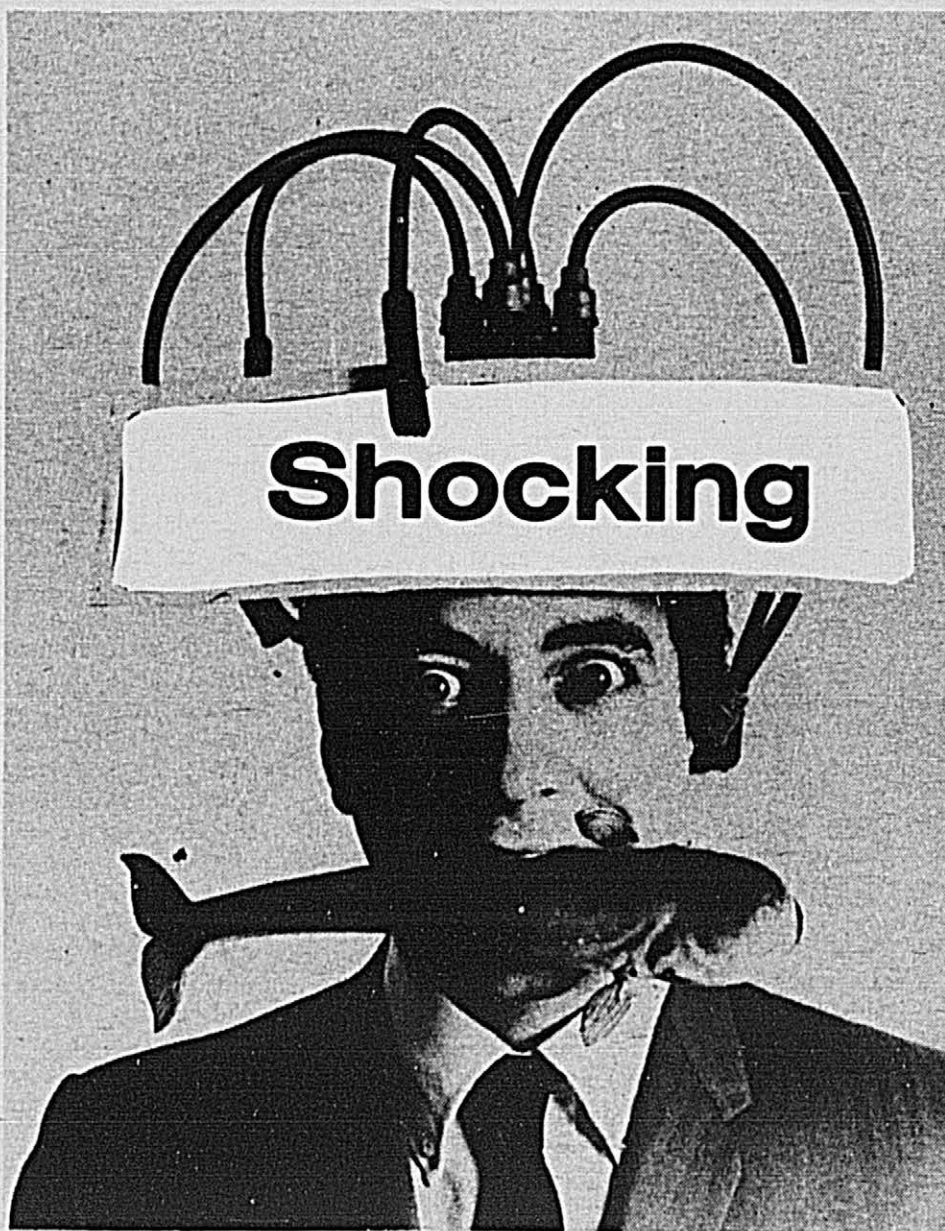
sensitive instruments, also make use of their discharge for hunting.

By setting up an electric field about itself an electric fish can sense objects in its path by the change in the field that occurs when approaching an object. Often these fish are near blind and rely on the electric field for guidance.

It is interesting that they usually swim with their spine rigid. It is believed that this style of swimming may serve to keep electric generating and detecting organs aligned.

The stronger electrical fish emit their largest pulses in short bursts at high frequencies. The eel for example, is capable of discharging 600 volt pulses at a rate of several hundred per second, for a fraction of a second. After discharging at such a high rate the fish, like a rechargeable battery, must allow for a certain amount of time to recharge (for the potassium and sodium charges to build up).

The strong, short bursts, their unpredictability, and then the relatively long waiting period before repeat charges can be given off make the



it to generate much higher currents than the eel (50 amps), but at a voltage between 50 and 60 volts. With this high electric power the Electric eel and the Torpedo ray are capable of stunning and even in extreme cases, electrocuting a human being.

The strongly electric fish, such as the eel, the ray and the African catfish, use their power as a defense, yet also offensively as a hunting weapon to stun or kill their prey. Some of the weakest electric fish whose electrical discharge is not even detectable by anything but

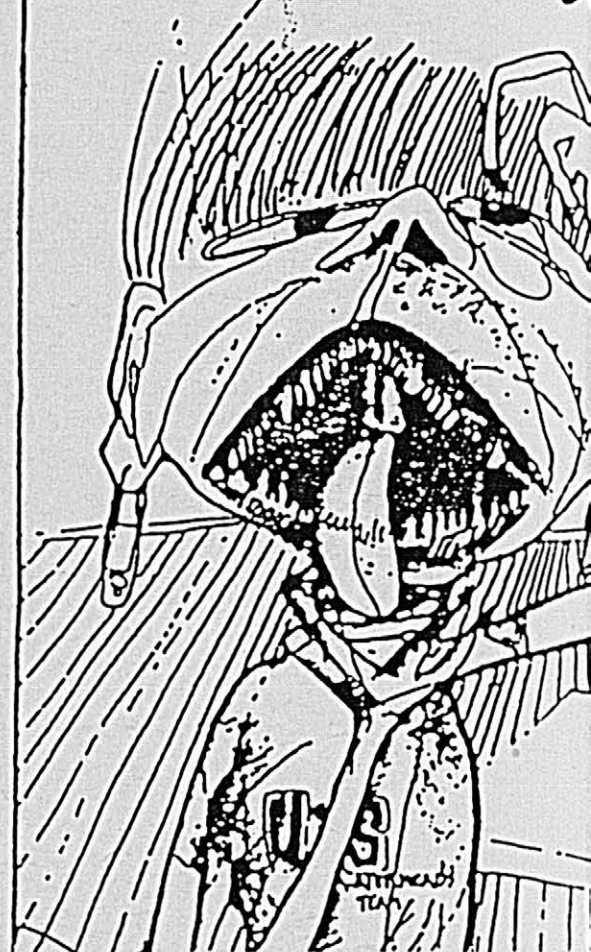
harnessing of this energy highly unreasonable.

Through evolution electric fish have developed specialized organs from muscles. These muscles have lost their ability to contract, but have gained the ability to arrange muscle cells in such a way as to produce electric power.

The voltage difference across one of the electric organ's cell is only slightly higher than that across a human muscle cell. Therefore the large output of these fish are capable of is based on arrangement of the cell membranes.

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Alcoholism and heredity

by Leah Geller

As students, we spend much of our time indulging in a favorite vice, drinking. Although many of us spend much time in contact with this intoxicant, few of us actually take time to consider the effects and influence it has on ourselves and our society.

In our somewhat closed academic setting, we see only bits and pieces of the real problems alcohol can cause. A school friend mentions that his father deserted the family and alcohol was the main cause. Or you overhear statistics about the cost of alcoholism to society. And everyone experiences the homeless "drunk" hanging out in the metro station.

But few groups have been willing to tackle the task of studying the effects of alcohol. Research in the field of alcoholism has in fact often been neglected, despite the impact it has on our society. The cost of alcoholism to society exceeds \$60 billion per year in the US and \$6 billion in Canada. Alcohol abuse ranks among the top three public health problems today. And more than one in four first admissions to psychiatric hospitals are caused by alcoholism.

The Alcohol Research Program (ARP), affiliated with McGill, the Douglas Psychiatric Hospital and the World Health Organization is studying alcoholism from many angles. Involved in the group are McGill psychiatrists, psychologists, geneticists, pharmacologists, and electrophysiologists. They are all interested in looking at how alcoholism is inherited and who is at risk.

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Past studies have used different ways of showing that alcoholism can be inherited. One study of the offspring of alcoholic fathers, showed that one child out of five becomes an alcoholic. This is significantly greater than the national average of one person in 20 being an alcoholic. Adoption studies show that a child born of an alcoholic father, but adopted early by a non-alcoholic family carries three times the risk of becoming alcoholic himself.

Is the person that has inherited a vulnerability to alcoholism different from the rest of the population? Is this difference expressed in behaviour, or can the difference be found as changes in chemicals in the blood, electrical current in the brain, or as differences in levels of important neurotransmitters?

The ARP is studying many possibilities.

Dr. Christina Gianoulakis, an assistant professor of psychiatry at McGill, is studying a fascinating group of chemicals in the body called endorphins. The endorphins are part of a family of naturally occurring brain chemicals called endogenous opiates. Their structure and action are similar to the group of drugs called opiates, such as mor-

phine and heroin. Like these drugs, they affect the brain in a way that eases pain as well as contributing to a sense of well being. They are often associated with producing the pleasant feeling known as "runner's high".

Is it possible that someone becomes an alcoholic because of low endorphin levels which can only be increased by alcohol? If so, it would seem natural that the alcoholic would "feel good" because of alcohol, and would continue the drinking habit in order to maintain higher endorphin levels.

Alcohol itself has no specific receptors in the brain and may exert its effect by interacting with other neural systems related to positive reinforcement such as the endorphin system.

In fact, Gianoulakis compared adults with families subject to high rates of alcoholism to adults with no alcoholism in the family for three generations. Surprisingly, it is difficult to find anyone that has no alcoholism in the family. Although the study is at this point incomplete, she did find a pattern where the high risk adult had lower levels of endorphins before drinking. After drinking a dose of alcohol the levels of endorphins rose.

The ARP is also experimenting with new drug treatments for alcoholism. According to psychiatrist Dr. Maurice Dongier, co-director of the program, most existing treatments are essentially psychological and social. Alcohol however creates lasting disorders in brain chemistry which we should attempt to correct with medication.

Dongier explains, "alcohol is an addictive drug like cocaine or morphine which creates dependency, that is it modifies brain chemistry in such a way that the addict experiences an irresistible need to obtain his dose of drug. If he does not, he enters a state of anxiety and depression. These unpleasant feelings correspond to chemical abnormalities in the brain, only temporarily relieved by alcohol which then perpetuates the vicious circle. Tranquilizers and antidepressant drugs usually do not provide a solution but often compound the problem.

"The medication being experimented with at the ARP is of a completely different nature. Its goal is to correct the abnormalities created by chronic alcoholism in specific areas of the brain, and thereby to cut the craving for alcohol, as well as the symptoms of anxiety and depression which are secondary to alcohol addiction more often than pre-existent."

The ARP depends on a valuable group of subjects that participate in the different facets of the research. If you come from a family of many alcoholics, you would be an important asset to our research. All information is confidential. Some monetary compensation is made for your participation, however the main reward is in increasing your knowledge and understanding of how alcoholism affects you as well as contributing to important alcohol research. We are also interested in male subjects, age 20 to 30 who come from families with no known alcoholism in the family for three generations. If interested, you may contact the ARP at 761-6131, local 2318 and ask for Leah.

Mechanical Engineering meets medicine

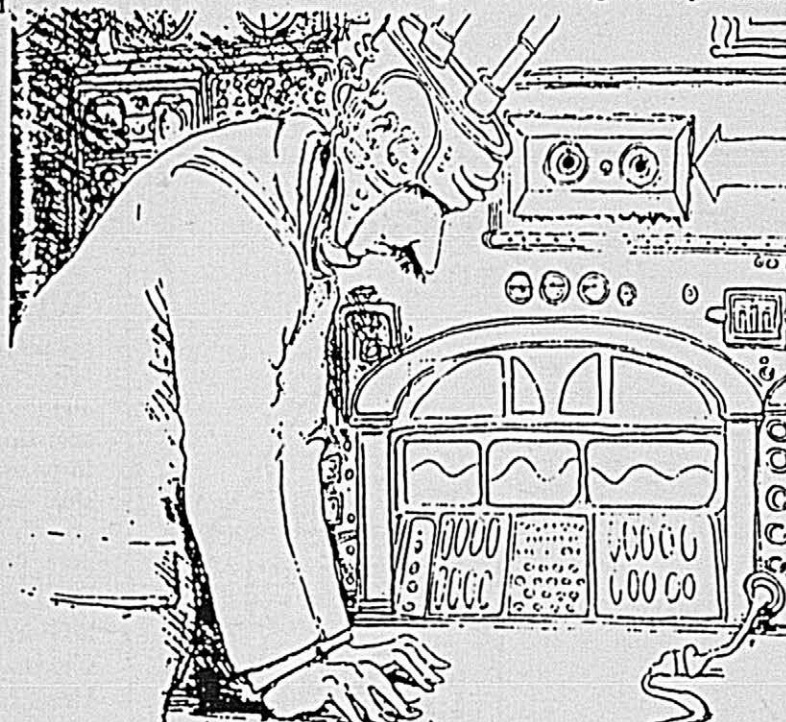
by Kirby Losch

In a deep recess of the McDonald Engineering Building, a unique brand of research combining Engineering with Medicine is taking place.

The Biomechanical/Biomaterials Laboratory, operating under the Department of Mechanical Engineering, is unique in Canada with its investigations into the mechanics of the human musculoskeletal structure and the development of artificial human joints.

Founded some ten years ago by Professor Abdul M. Ahmed, this lab specializes in research on the knee and spine. He chose this area of research as it is relatively new and "there are tangible and immediate results to be realized, which is an attractive feature."

The underlying motivation in the Biomechanics Lab is that any new surgical procedure or design of prosthesis cannot be performed without a thorough knowledge of the mechanical function that is to be restored.



The human knee joint is an intricate and complex part of the human body. Although, at first glance, it performs a similar motion to that of a simple pin joint, it has no pin about which to rotate. It performs to six-degrees-of-freedom articulation through a network of passive tissue, muscles, ligaments and the surface geometry on which it moves.

The first task of the Biomechanics Laboratory was to properly simulate the forces and moments experienced by a human knee during everyday activities, on an amputated knee. The result was the world's first six-degrees-of-freedom knee testing apparatus (jig). A similar jig was developed for the spine.

With the development of experimental simulation established, the Biomechanics Research Group (BRG) demonstrated the function of the meniscus (the cartilage

situated on top of the tibia upon which the femur articulates). In the past, its exact function was unknown - similar to the appendix. Any tear in the meniscus was usually followed by a total meniscectomy or total removal of the meniscus, often resulting later in arthritis.

The BRG demonstrated that the meniscus serves a load bearing function, that is, it evenly distributes the force on the tibia. The preferred technique became treatment or partial removal of the meniscus.

There are over one million people in North America with artificial joints, or prostheses. These prostheses are surgically implanted to replace a human joint which has suffered severe arthritis or has been injured beyond repair.

A major problem with the prostheses is that, in time, a loosening occurs between the bone cement-prosthesis interface. The highly polished metal surface of the prosthesis is not conducive to forming a strong bond with the cement. The fat and blood present during the operation is another

deterring factor. The BRG found that by first applying a thin layer of bone cement on the prosthesis under controlled conditions, and then fixing the prosthesis to the bone, resulted in a more reliable fixation. This process was later patented.

Other projects presently underway in the Biomechanics Lab include the development of an artificial knee which will allow greater mobility and an improved failure rate, as well as a bone-ingrowth prosthesis where the bone will eventually "grow" onto the prosthesis surface so as to eliminate bone cement.

Looking to the future, Ahmed and the BRG are working on a true dynamic jig which will accurately simulate walking, climbing stairs and eventually running. The development of a more realistic model of the spine, to aid in the treatment of scoliosis, is also going to be undertaken.

THE McGill Daily

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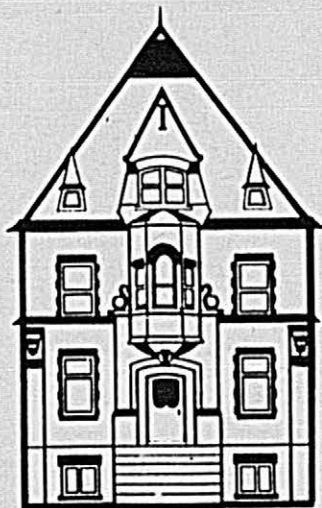
Applications: advised by March 31, but accepted until May 31. Information and applications now available from: Teacher Education Office, Faculty of Education, UBC, 2125 Main Mall, Vancouver, B.C. V6T 1Z5 (604) 228-5221 (messages, 24 hours)

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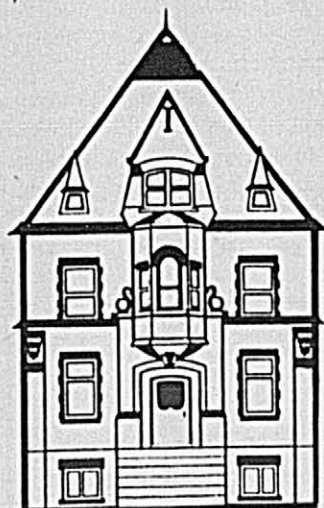


You Are Invited To:
"Catholic Bishops:
What Can They Tell Us About The
Economy?"

A lecture and
discussion by
Dr. Gregory Baum
McGill Faculty of
Religious Studies

Thursday evening,
7:30 pm
March 5, 1987

McGill Newman
Centre
3484 Peel Street
tel: 392-6711

**... Non-students occupy**

continued from page 1

ing FAEs, says they are offensive weapons. "Anyone who says these things have a defensive application — including the defence department — is lying through their teeth," she said.

FAEs were reportedly used in Vietnam, the 1982 invasion of Lebanon, and in Afghanistan. "They narrow the gap between nuclear and non-nuclear weapons," she said. "They are said to make good heads or cruise missiles."

Last week, the Students' Society of McGill University endorsed the goals of an ad-hoc committee opposing FAEs research at

McGill, but did not endorse an occupation.

According to Kaler, last year's student representative to the Board of Governors, the two groups share the same goals, but the occupation is "premature."

"The other avenues have not been exhausted," she said.

The meeting of the Board of Governors' executive last Monday referred the question back to the committee overseeing graduate research. But this committee affirmed its approval of the contract yesterday, according to MacLachlan.

None of the three occupying the office are McGill students. But

said protester David Lennox, a former McGill student, "It's not just a student issue: It's a community issue. Students should take a stand because it's wrong."

MacLachlan cut off the telephone lines to the office shortly after the occupation started. "I didn't want to facilitate their communication," he said.

But, he said, the university does not intend to call the police in to remove the protesters. How long they stay is, he said "up to their metabolism."

The group, called 'The Little Red Wagon', is asking for an emergency meeting of the executive of the Board to reverse the decision. But according to the Board's secretary, Nathan Moss, five days notice are necessary for such a meeting to take place.

The Chairman of the Board, Hugh Hallward, said he would not consider calling such a meeting. "As far as I know, the system works — otherwise we wouldn't be where we are."

"If you have people off the street occupying McGill offices then the next step is anarchy."

The protesters, who describe themselves as non-violent, were active in the Direct Action Network campaign against the arrival of Namibian uranium in Montréal this summer.

events

Today

Alpine Ski Team: No meeting. Training 16h30, meet Milton gates.

PC McGill: Election of next year's officers 3473 University. Info 286-0420.

History Students' Association: General meeting. 15h00, Lea 214.

McGill Squash Club: Club night, tournament sign-up. 19h00, Currie gym squash courts.

McGill Photo Society: Photo contest and exhibition. Deadline Mar. 6.

East Asian Studies Dept.: *The Demise of Japanese Labour* with Prof. Ichio Muto. 15h00, Bronf. 601.

McGill Outing Club: General meeting 19h30, Lea 232.

International Women's Week: *Women, Family and Therapy* with Prof. S. Steele. 12h00, Union B-09/10.

Dept. of Anthropology: *Persian Pastoralists in the World System*. 12h00, Lea 738.

Gert's: *Planet of the Apes* filmfest. 19h00. Free.

AIESEC McGill: *International Shipping in the 80's* with Philip K. Gorick. 12h00, Bronf. 451.

Peace and Political Action: With Prof. J. Tully. 14h00, Lea 14.

Women's Union: General meeting. 16h30, Union 423.

International Women's Week: *The Fear of Rape*, a documentary film. 19h00, Union B-09/10.

Irish Studies: *Oral Literature in Ireland* with Angela Bourke. 20h00, Arts Council Room.

The Yellow Door Coffee House: *The Written Word Performed Aloud* by Montreal Writers. With Lynn Henderson, Linda Ghan, Edward O. Phillips, and Michael Harris. 21h00, 3625 Aylmer, \$1.50.

Mein Blut ist Lava.

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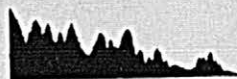
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Wednesday, March 4:

"Children and Peace Education"

Tuesday, March 10:

"Peace Activism"

Wednesday, March 18:

"Religion and Peace"

All workshops will take place at 12:00 noon at the Newman Centre, 3484 Peel Street (below Dr. Penfield).

For more information contact McGill Chaplaincy Service: 392-5890.

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McGill Student Pugwash

classified

Ads may be placed through the Daily, Room B-03, Student Union Building, 9 a.m. to 3 p.m. Deadline is 2:00 p.m., two weekdays prior to publication. McGill students: \$2.50 per day; for 3 consecutive days, \$2.00 per day; more than 3 days \$1.75 per day. McGill faculty and staff: \$3.50 per day. All others: \$4.00 per day. *Exact change only, please.* The Daily assumes no financial responsibility for errors, or damage due to errors. Ad will re-appear free of charge upon request if information is incorrect due to our error. The Daily reserves the right not to print a classified ad.

341 — APTS., ROOMS, HOUSING

Roommate needed to share semi-furnished 4½. Excellent downtown location, fantastic view, pool, sauna, fully carpeted. Immediate occupancy. Phone 933-6401.

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Sublet May, unusually large Ste-Famille mansion, castle in sense, full library, window seats, skylights, balconies, expansive living space. Rent 180 (let us meet you) - Gillian 288-6876.

To sublet May 1 - September 1, spacious 4½ 3647 Durocher. Furnished, newly renovated, laundry facilities, minutes to McGill and Steinberg's, sunny with hardwood floors. \$575/month (negotiable), call Sue or Rose 845-1448.

Largely sunny 4½ on Côte St-Luc Road to share or sublet furnished, available March 1 until June 30, negotiable. Call 489-9424.

Really groovy place to sublet or transfer lease from this May until next. 4½, skylights (2) kinda far (Fairmount & St-Laurent), but it's worth it. Lux & The Bagel Factory are seconds away and hey! it's even got something that resembles a balcony! Great spot for that early morning coffee! Call 274-2867.

4½ to sublet: from May 1 to August 31. Cozy and quiet basement apartment on Prince Arthur, 5 min. to McGill. Call Rob 284-0119.

Roommate wanted! Share beautiful 7½ with 2 male students. 10 mins. from McGill (St-Marc & Sherbrooke). Available Feb 23. \$230 until June 30. Call Chris 931-0448 after 5:00 pm.

Urgent — nice, just renovated 4½ to share. Big room - \$215/month, heated, near U of M campus, call François 341-1494.

1½ apartment and a room to rent \$220/month each. Everything included available immediately. Call 843-8920 or 849-8241

Looking for 3½ near McGill to sublet for April 1. No bugs. 286-0364 before 10 pm.

An 8½ to share with two students \$140/month, available now, St-Urbain corner of Duluth. Call 286-9118.

343 — MOVERS

Moving? All local moves done quickly and carefully by student with large closed truck. Fully equipped, reasonable rates. Call Stéphane - 288-8005.

Student with his large van will help you move at a very reasonable cost. Call Turan anytime at 747-0307.

350 — JOBS

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352 — HELP WANTED

3rd year commerce / accounting student needed for part-time bookkeeping for small business on LaCordair Blvd. 327-9168 please leave message.

Strong person wanted (evenings) to care for man with Parkinson's disease. Call 731-0111 after 10 am.

Metropolitan News, 1248 Peel St. Newspapers, maps, the latest fashion publications from all over the world. Toronto Star, Ottawa Citizen available 10 am same day. Needs office and general help, full and part time. Apply in person.

354 — TYPING SERVICES

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361 — ARTICLES FOR SALE

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Attention divers! Inexpensive accommodations available in Cozumel, Mexico - a diver's island in the Caribbean. Interested? Call Pat 482-4160.

Brother electric typewriter with correction. Case included. 4 years old. Excellent condition \$110. 933-8982 until midnight.

372 — LOST & FOUND

Found: Richard J. Millar - Faculty of Music, your books are at the Wendy's on Peel Street. Come get them.

374 — PERSONAL

Carol, Carrie, Geneviève, Inez, Maggie, Mimi, Nabila, Nevine, Sarah, Tibbie, Derek, Geoff, Jean, Liam, Mario, Phil, Kent, Joy, Mark, Lisa and Chris. Nobody does it better! XO Doug.

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383 — LESSONS OFFERED

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385 — NOTICES

Grand Opening: Galerie de Ho. Saturday 28 February 1987. Sophie Ho: Chinese painting exhibition. Classes available. 102 B de la Gauchetière W., 1st floor. 393-1048.

Grad Ball: tickets are now available at Sadie's for \$25 each for the Red and White. There is a limited number of tickets. Information, 392-8950.

I wanna rock-a-thon (in chairs!) support Crossroads. Gert's 8 am - 10 pm, Friday. Free donuts if you rock with us. Info in Union Lobby, Tues / Thurs.

Gertrude's Pub presents on Saturday, March 7, from Toronto - "Vital Sines". New wave at its best! 10 pm.

Lost Control: A Fashion Statement — Bronx - Les Terrasses, Crise - 3613 St-Laurent, Esprit, Inutile - 4665 St-Laurent, Kappa - 369 Laurier, Parachute - 3526 St-Laurent, Pour Lui - 366 Laurier, Estetica - 2175 Crescent, Kahlúa. Thank you all very much.

387 — VOLUNTEERS

Subjects needed for alcohol research: healthy male undergraduate social drinkers (18-35 yrs.), get paid \$25. Call 392-4912 anytime.

Subjects needed for EEG study: males age 20-30 with no family history of alcoholism for past 3 generations. \$30.00. Call Leah 761-6131 local 2318.

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Halifax, Nova Scotia

STUDENTS' SOCIETY OF MCGILL UNIVERSITY

ELECTIONS

MEET THE CANDIDATES

COME ONE, COME ALL and meet this year's candidates. Find out what next year's executive intends to do to you!

Thursday, March 5
1:00 pm
Union Building
Rm 302

Monday, March 9
1:00 pm
Bronfman Building
Cafeteria

Wednesday, March 4
12:00 pm
McConnell Engineering
Common Room



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McGill Chinese Students' Society

ELECTIONS

Elections for the McGill Chinese Students' Society Executive Committee (MCSS):

President(1)	Cultural Director(1)
VP Internal(1)	Social Director(1)
VP External(1)	Sports Director(1)
Secretary(1)	Publicity Director(1)
Treasurer(1)	Publication Director(1)

Will be held March 20th, 1987 in Rm 410 of the Student Union Building from 8:00 pm. Nominations for these positions will open March 2, 1987 and close March 12, 1987. Nomination sheets will be available March 2, 1987, with the requirements for each position in Rm 402 of the Student Union Building.

Edwin Zung will be the Chief Returning Officer.

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A.S.U.S. Elections

MARCH 24th & 25th

Nominations are now open for the following Arts & Science Undergraduate Society positions:

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V-P FINANCE
V-P ARTS
V-P SCIENCE
V-P ADMINISTRATION

THREE ARTS REPRESENTATIVES
TO SSMU
TWO SCIENCE REPRESENTATIVES
TO SSMU COUNCIL
TWO ARTS MEMBERS AT LARGE
TWO SCIENCE MEMBERS AT LARGE

*Nominations Forms are available at the A.S.U.S. Office
— Room 319 Leacock or call 392-8950*

NOMINATIONS CLOSE THURSDAY - MARCH 12th at 12 noon

Alix MacLean - Chief Returning Officer

McGILL
ARTS & SCIENCE
UNDERGRADUATE SOCIETY